Gauge pressure transmitter
Model: SMT2002

Spec. sheet no. SD02-02

Service intended

The high performance pressure transmitter SMT2002 is suitable to measure liquid, gas, or steam flow as well as liquid level, density and pressure.
The key features include quick response, remote set-up using communications, self-diagnostics and optional status output for pressure high/low alarm.

Degree of protection

EN60529/IEC529/IP66
EN60529/IEC529/IP67

Standard features

Accuracy
±0.05 % of calibrated span
±0.075 % of calibrated span

Range limits
6 kPa to 40 MPa

Turn down
Adjustable up to 100:1 range ability

Temperature compensation
High sensitivity temperature sensor packaged in the sensor

Measured value number
Max.7-digit character string comprising letters and numbers.

Isolating diaphragm
Stainless steel 316L
Hastelloy C
Stainless steel 316L with Gold Plated

Measurement medium
Gas, steam and liquid

Stability
10 years stability
0.15 % of URL

Output
4 ~ 20 mA with HART protocol

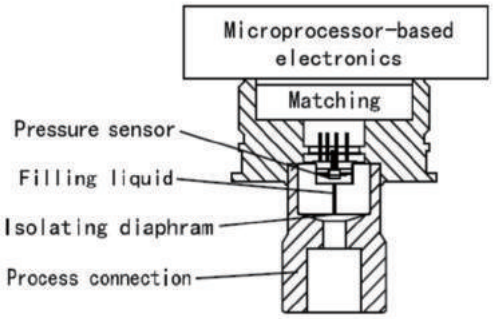
Principle of operation

Main unit includes sensor and Process connection,
Works as follows.
The process medium through a flexible, corrosion resistance of the isolation diaphragm and the fill fluid pressure is applied on the measuring silicon pressure chip.

A termination of the chip connected
at the atmosphere (for a gauge pressure measurement)
or vacuum (for absolute pressure measurement).

When the measured pressure through the measuring diaphragm and the filling liquid is transmitted to the sensor silicon chip, so that the silicon chip of the sensor resistance changes, resulting in change in output voltage of the detection system. this output voltage is proportional to the pressure change. The output is transfer into a standardized signal output by adapter unit and amplifier.

The temperature sensor as a temperature compensated reference value to compensate for the temperature drift.



Main specification

- The gauge pressure transmitter utilize the world's leading high stability silicon sensor, the highest Reference Accuracy is ±0.05 %
- The transmitter allowable over pressure is up 50 MPa with GP sensor H.
- High sensitivity temperature sensor packaged in the sensor. The minimum of the temperature error is ≤ ±0.05 % / 10 K
- Stainless steel 316L and silicone oil filling welded seal structure.
- Long stability is ≤ ±0.1 % / 3 years, 10 years of maintenance-free
- Adjustable up to 100:1 range ability
- The remote seal transmitter utilize ultra-high temperature(400 ℃) patented technology.

Standard Specifications

Performance Specifications

Reference Accuracy of Calibrated Span (includes terminal-based linearity, hysteresis, and repeatability)
± 0.075 %. If TD > 10, ±(0.075 × TD)% TD = Nominal Pressure Range / Adjusted

The square root accuracy is 1.5 times of reference accuracy of calibrated span.

Ambient Temperature Effects

-20～65 ˚C：±(0.2 × TD + 0.05)% × Span
Every 10 ˚C is ±0.08 % ×Span (TD=1)
-40～-20 ˚C and 65～85 ˚C：±(0.3 × TD + 0.1)% × Span

Overpressure Effects

±0.075 % × Span

Stability

±0.1 % × Span / 3 years

Power Supply Effects

±0.001 % / 10 V (12～42 V DC)

Explosion protection

■ ATEX, IECEx Flameproof enclosures
Ex db IIC T4 / T5 / T6 Gb
Ex tb IIIC T80°C / T90°C / T130°C Db
Ta = -40°C to +60 °C
ATEX Cert. : CML 17ATEX1235X
IECEx Cert. : IECEx CML 17.0157X

■ KCs Flameproof enclosures
Ex d IIC T6
Ta = -40°C to +60 °C
KCs Cert. : 19-KA2BO-0013X

■ KCs, ATEX, IECEx Intrinsic safety
Ex ia IIC T4...T6 Ga
Ex ia IIC T4...T6 Ga Ex ia IIIC T80˚C / T90°C / T130°C Da
ATEX Cert. : CML 19ATEX2502X
IECEx Cert. : IECEx CML 19.0190X

■ KCs Intrinsic safety
Ex ia IIC T4/T5/T6
Ex iaD 20 T80˚C / T90°C / T130°C
KCs Cert. : 20-AV2BO-0595X / 20-AV2BO-0596X

■ FM Approvals
CL 1, DIV 1, GPS ABCD T6...T4;
CL II, III, DIV 1, GPS EFG T6...T4
CL1, ZN 1, AEx/Ex db IIC T6...T4 Gb
ZN 21 AEx/Ex tb IIIC T85°C...135°C Db
Ta = -40°C to +60°C with Silicone o-ring
Ta = -20°C to +60°C with NBR o-ring
IP66/67
TYPE 4X (Only when using stainless steel housing)
FM Cert. : FM23US0038X / FM23CA0028X

Functional Specifications

Span and Range Limits

Sensor	B	C	D	E	F	G	K	H
Pressure range (bar)	60 mbar	400 mbar	2.5 bar	30 bar	100 bar	210 bar	10 bar	400 bar
Setting limits (offset and span in this range freely adjustable)	-60 ... 60 mbar	-400 ... 400 mbar	-1 ... 2.5 bar	-1 ... 30 bar	-1 ... 100 bar	-1 ... 210 bar	-1 ... 10 bar	-1 ... 400 bar
Lowest permissible span	6 mbar	20 mbar	25 mbar	0.3 bar	1 bar	2.1 bar	0.1 bar	4 bar
Overpressure limit	2 bar	10 bar	40 bar	150 bar	200 bar	500 bar	60 bar	500 bar
Range ability turndown (with respect to the differential pressure range)	10:1	20:1	100:1	100:1	100:1	100:1	100:1	100:1

Standard Specifications

Turn-down Accuracy

If the Accuracy is (%) : 0.075
If Turn-down ≤ 10:1, ±0.075 % FSO
If Turn-down > 10:1, ±[0.0075 x Turn-down] % FSO
With Turn-down = Nominal Pressure Range / Adjusted Range (FSO = Full Scale Output)
(Only available with sensor C~H.)

If the Accuracy is (%) : 0.075
If Turn-down ≤ 5:1, ±0.075 % FSO
If Turn-down > 5:1, ±[0.0075 x Turn-down x 2] % FSO
Turn-down = Nominal Pressure Range / Adjusted Range (FSO = Full Scale Output)
(Only available with sensor B.)

Zero Adjustment Limits

Zero can be fully elevated or suppressed, within the lower and upper range limits of the capsule.

External Zero Adjustment

External zero is continuously adjustable with 0.01 % incremental resolution of span. Re-range can be done locally using the range setting switch.

Mounting Position Effects

Rotation in diaphragm plane has no effect. Tilting up to 90° will cause zero shift up to 0.25 kPa which can be corrected by the zero adjustment.

Output

2 wire 4~20 mADC output with digital communications, linear or square root programmable.
HART FSK protocol are superimposed on the 4~20 mA DC signal. Output range: 3.9 mA to 20.5 mA.

Failure Alarm (the mode can be selected)

Low Alarm Mode (min) : 3.7 mA
High Alarm Mode (max) : 21 mA
Alarm Off (Keep) : Keep the effective value before the fault.

* Error signal (NAMUR NE43) : High/Low (Adjustable)
* Note : The standard setting of failure alarm is High Mode.

Response Time

The amplifier damping constant is 0.1 sec.
The sensor damping constant is 0.1~1.6 sec, it depends on the range and range compression ratio.
Amplifier damping time constant is adjustable from 0.1 to 60 sec by software and added to response time.

Warm Up Time

< 15s

Permissible Temperatures

Environment / storage without display : -40 to 85 °C
with display : -20 to 65 °C
Media wetted parts /Filled oil : -40 to 100 °C
(Info: +125°C short time, max. 30 min.)

Standard Specifications

HART digital communication and 4 to 20 mA output Power Supply

The transmitter operates from 12 to 42 V DC with no load and is protected against reverse polarity connection
Minimum operating voltage increase to 12 V DC with surge protector

Ripple

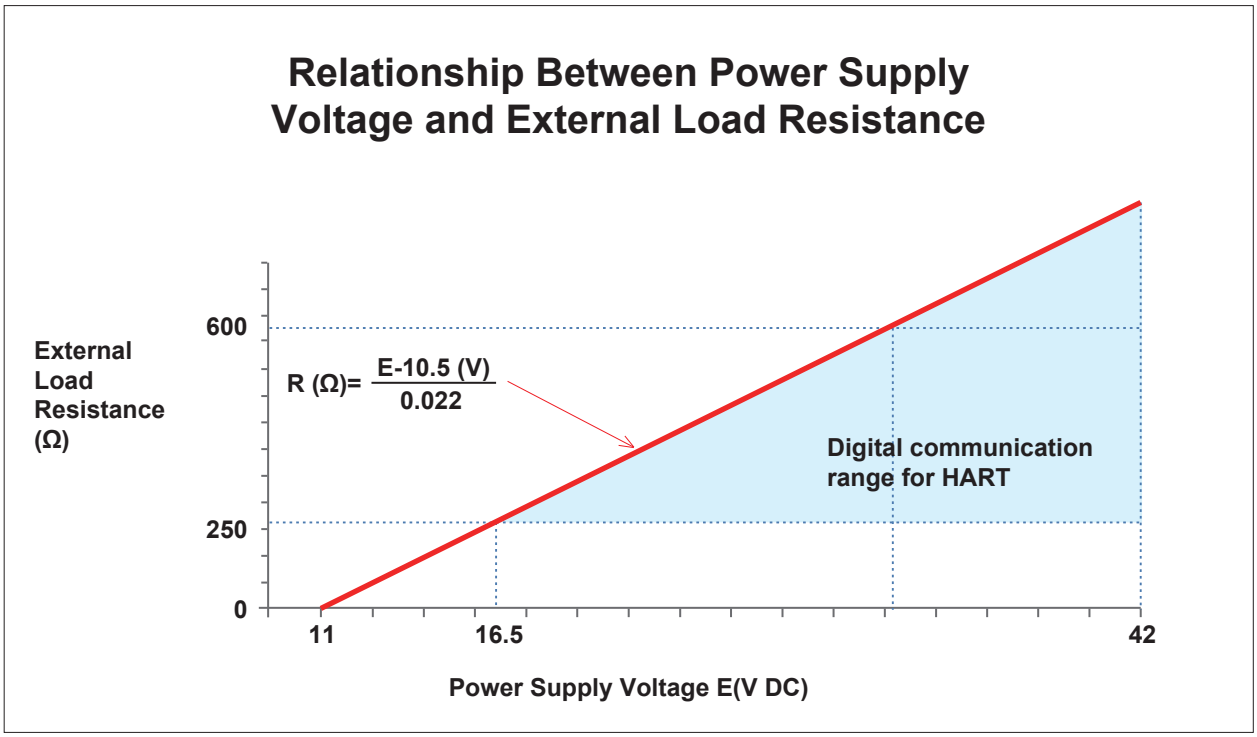
20 mV max on a 250 Ω load as per HART specifications.

Load limitations

4 to 20 mA and HART total loop resistance :

$$R\ (\Omega) = \frac{\text{Supply voltage} - \text{min. operating voltage (V DC)}}{22\ \text{mA}}$$

A minimum of 250 Ω is required for HART communication.



Supply and Load Requirements

24 VDC supply, R≤(Us-12 V) / Imax kΩ, Imax = 23 mA.
Maximum voltage limited: 42 VDC
Minimum Voltage limited: 11 VDC without LCD display
Minimum Voltage limited: 12 VDC with LCD display
250 Ω to 600 Ω for digital communication

Electrical protection

Short –circuit protection is permanent.
Reverse polarity protection is not damage, but also is no function.

Electrical Connection

The electrical connection is made via cable entry ½NPT(F)
The screw terminals are suitable for wire cross-sections up to 2.5 mm²

Standard Specifications

Process Connection
Default Process Connection：½ NPT female thread

Electromagnetic field
Meets all the requirements of EN 61326 and NAMUR NE-21. it can be changed to ½ NPT,G½,M20x1.5 male thread and KF16 vacuum Connection with Union.

Load
Within load/voltage specified limits the total effect is negligible

Install

The transmitter housing can be rotated about 360 degrees relative to the transmitter module without affecting the performance and internal wiring.

Transmitter can be operated Through the PC machine or notebook computer via modem.
Modem can be connected in parallel to the signal circuit at arbitrary point.
The modem communicates with the transmitter through an AC signal superimposed on the 4~20 mA output signals.
This modulation does not change in the mean values, so does not affect the measurement signal.

Physical Specifications

Isolating Diaphragm
Stainless steel 316L
Hastelloy C
Stainless steel 316L with Gold Plated

Process Connection
½" NPT (Female)
½" NPT (Male) with Union
M20 x 1.5P (Male) with Union
G ½" (Male) with Union
½" PF (Male) with Union
¼" NPT (Male) with Union
Others

Fill fluid
Silicone oil
Fluorinated oil

Name plate and tag
Stainless steel 304

Amplifier Housing
Aluminium with epoxy resin coat
Stainless steel 316

Mounting Braket
Stainless steel 304 / 1.4301
Carbon steel galvanized

Conduit Connection
½NPT(F)
M20 x 1.5P (Option)

Weight
1.6 kg

Degrees of Protection
IP66/IP67

CE conformity EMC directive
EN 61000-6-2:2005
EN 61000-6-4:2007/A1:2011

Main order — Ordering information

1. Base model

SMT2002	Gauge Pressure Transmitter

2. Measuring Span

B	6~60 mbar (Only available accuracy 0.075 %)
C	20~400 mbar
D	25~2500 mbar
K	0.1~10 bar
E	0.3~30 bar
F	1~100 bar
G	2.1~210 bar
H	4~400 bar

3. Accuracy

5	0.05 % (Only C~H Sensor)
7	0.075 % (Only B~H Sensor)

4. Indication

N	None
D	Display (LCD)

5. Wetted parted materials (Seal diaphragm/Sensor body)

L	316L SS / 316SS
H	Hastelloy C-276 / 316SS
G	316L SS with Gold Plated / 316SS

6. Filled by fluid

S	Silicone oil
F	Fluorinated oil

7. Explosion protection

N	None
A	Ex ia (ATEX)
B	Ex ia (IECEx)
C	Ex ia (KCS)
D	Ex d (ATEX)
E	Ex d (IECEx)
F	Ex d (KCS)
G	Ex d & tb (FM)

8. Housing material

A	Aluminium 1/2"NPT(F) (STD)
B	Aluminium M20*1.5P(F)
S	316SS 1/2"NPT(F) (STD)
T	316SS M20*1.5P(F)

9. Mounting bracket material

0	None
5	Carbon steel galvanized
4	304SS
9	Other

10. Process connection

F	1/2" NPT (Female)
M	1/2" NPT (Male) with Union
G	G 1/2" (Male) wtih Union
S	1/2" PF (Male) with Union
Q	1/4" NPT (Male) with Union
Z	Other

11*. Accessory

N	None
V	Manifold valve
O	Other

* Note : Refer to A080's Specification and order valve(A080) separately. It's separate option.

12. End plug

1	Plug_Ni Plated Brass (Only Ex proof)
2	Plug_Stainless Steel (316SS) (Only Ex proof)
3	Plug (Without explosion protection)

Sample ordering code

1	2	3	4	5	6	7	8	9	10	11	12
SMT2002	B	5	N	L	S	N	A	5	F	N	1

Optional specification

This catalog provides additional optional information beyond the main ordering information for the basic models of SMT200X

1. Select option code for marine approvals

If marine approvals is required, please select the code below.

Type	Description	Code
Classification (Marine approvals)	KR (Korean Register of Shipping)	KR
	ABS (American Bureau of Shipping)	AB
	DNV (Det Norski Veritas)	DN
	LR (Lloyd's Register)	LR
	BV (Bureau Veritas)	BV

[Example]